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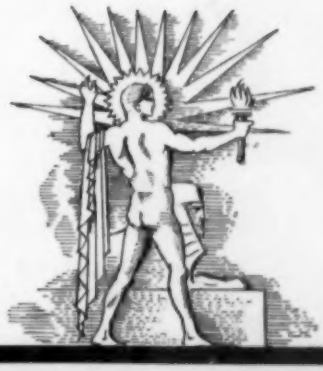
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MARCH 11, 1933

Terror of the Tar-Pits

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VOL XXIII *No. 622*

The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

The horned lizard does not drink water but absorbs it when sprinkled on its skin.

A new food made of milk and corn meal, developed by Cornell University, is said to have varied possibilities.

The coral lilies, which wear the Christmas red color, can be forced for Christmas bloom, government experiments show.

More than 18,000 barberry bushes have been destroyed in 15 years of government campaigning to protect wheat against stem rust.

Hoover Dam will create the largest artificial reservoir in the world, holding water enough to cover New York State to a depth of one foot.

Rain water has so worn off the cornice of St. Paul's Cathedral in London, that now, to save the cornice, rain is carried down inside the building.

The Rocky Mountain goat ranges higher on the mountains than the Alpine chamois or the goral of the Himalayas.

The British Museum has acquired a stone tablet dated about 1850 B.C., which describes the building of the temple at Nineveh.

One meat packer is putting a "bacon perfume" into the ink he uses for bacon labels, so as to make the package smell more appetizing and less like wrapping paper.

While deaths from cancer have mounted among white men over 45 years old, the cancer death rate among white women of the same age level has not changed.

A government scientist has discovered that grapes may be made shatterproof—so that they do not drop from the stem in shipping—by the application of carbon dioxide gas.

WITH THE SCIENCES THIS WEEK

ARCHAEOLOGY

Why has Tejupan become of great importance to archaeologists? p. 149. *Ancient Civilizations of Mexico and Central America—Herbert J. Spinden—American Mus. of Nat. Hist.*, 1928, $1.

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How much overdue is the outburst of the sun? p. 152.

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GEOLOGY

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PALEOBOTANY

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PALEONTOLOGY

Do the La Brea tar pits bury animals today? p. 150. *The Felidae of Rancho La Brea—John C. Merriam and Chester Stock—Carnegie Institution of Washington*, 1932, $8.

PHYSICS

Can sugar be chemically decomposed by mechanical vibrations? p. 152.

How may water be used successfully against oil fires? p. 153.

PHYSICS-ASTRONOMY

Why does the radiometer whirl around? p. 148.

PHYSIOLOGY

How does Norway protect nervous persons from drunkenness charges? p. 148. *Alcohol and Man—Ed. by Haven Emerson and others—Macmillan*, 1932, $3.50.

Should the blood of normal persons contain carbon monoxide? p. 154. *Tobacco and Mental Efficiency—M. V. O'Shea—Macmillan*, 1925, $2.50.

PSYCHOLOGY

Can a legislator's vote be explained by an equation? p. 148.

What proportion of people turn to the right after entering museums? p. 152.

SEISMOLOGY

Of what concern is Tuscarora Deep to Japan? p. 156.

These curiosity-arousing questions will be especially valuable to the teacher. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publishers' prices, prepaid in U. S.

CHEMISTRY

Lightest Water Made, and New Record for Heaviest Set

Concentrations of Light and Heavy Hydrogen Isotopes Account for Liquids Slightly Unlike Ordinary Water

THE WORLD'S lightest weight water, containing the lightest sort of hydrogen and the lightest variety of oxygen, has been manufactured in the chemical laboratories of the U. S. Bureau of Standards at Washington.

Last year Dr. E. W. Washburn, chief of the chemistry division of Uncle Sam's great scientific establishment, the Bureau of Standards, made what was then the world's heaviest water. Prof. Harold C. Urey of Columbia University checked the heavy water's composition with the spectrograph. They reported their achievement in the Proceedings of the National Academy of Sciences and exhibited the water at the American Association for the Advancement of Science meeting at Atlantic City last Christmas week. Now Dr. Washburn has made the lightest water known.

The Bureau of Standards heavy water contains increased amounts of hydrogen isotope two and oxygen isotope eighteen. The lightest water contains increased amounts of hydrogen isotope one and oxygen isotope sixteen. Both, of course, consist of one atom of oxygen and two atoms of hydrogen.

Until a few years ago it was not known that there are two kinds of hydrogen, one with just twice the atomic weight of the other. In 1931, Prof. Urey and Dr. G. M. Murphy of Columbia University and Dr. F. G. Brickwedde of the U. S. Bureau of Standards discovered the heavy weight hydrogen. It is also known that there are three weights or isotopes of oxygen atoms, 16, 17 and 18.

Dr. Washburn has just determined several physical constants of his heavy water. The heavy water freezes even when surrounded by ordinary melting ice. Its freezing point is five-hundredths of a degree Centigrade higher than that of ordinary water. Its boiling point is higher and its refractive index is lower.

The new lightest water must have physical constants differing from ordinary water in the opposite direction, but since ordinary water consists almost entirely of light-weight hydrogen and oxygen the difference between ordinary and light water is much smaller.

Drs. E. R. Smith and Mikkel Frandsen of the Bureau of Standards staff have worked with Dr. Washburn in his current tests on the light and heavy waters.

Ordinary water was the starting point in making both the heaviest and lightest waters. It was discovered that water in the electrolytic cells of oxygen and hydrogen gas plants had larger concentrations of the heavy hydrogen and oxygen. The light hydrogen and oxygen atoms go off as gas first when the electric current breaks down the water. Thus heavier water is left in the electrolytic cells. Dr. Washburn and his associates therefore decomposed water electrically over a long period and thus obtained heavy water. They burned the light hydrogen and oxygen gases to obtain the champion light (*Turn to Page* 158)

DEIFYING A SCOTSMAN

These two canes are adorned with features of Dr. William Patterson, who is god of medicine to Tule Indians of Panama. The Scottish doctor spent two years in Panama in a seventeenth century colonial venture. Now, the Indians think of him as a god who once lived in their midst and worked great wonders of healing. Dr. Walter Hough, of the U. S. National Museum is holding the canes.

MEDICINE

Successful Treatment For Strychnine Poisoning Found

STRYCHNINE poisoning may be cured by two modern sleeping potions, it appears from a report to the American Medical Association in Chicago, Ill. Successful use of these two medicines in eleven cases is described by Drs. G. F. Kempf, J. T. C. McCallum and L. G. Zerfas of the Lilly Laboratory for Clinical Research, the Indianapolis City Hospital and the Indiana University School of Medicine.

The two modern medicines are isoamylethylbarbiturate, sometimes called sodium amytal for short, and sodium pentobarbitol. They are known to induce sleep in restless, suffering patients. Directions for their use in strychnine poisoning are given by the Indianapolis doctors in *The Journal of the American Medical Association.*

Ordinarily, poisoning of any kind is treated by emptying the stomach and preventing the absorption of the poison into the system. Because strychnine is very quickly absorbed, these measures are usually unsuccessful, and treatment must be directed at counteracting the effects of the poison on the system.

Many drugs have been used for this purpose, but have not been satisfactory. Doctors have been searching for an antidote that would control the convulsions, get the poison out of the body, and supply oxygen so that the patient does not suffocate. Death in strychnine poisoning is due either to exhaustion or to suffocation, the Indianapolis physicians explained. The difficulty with most of the older antidotes for strychnine is that if much strychnine has been

taken, the amount of the antidote necessary to counteract its effects would be fatal in itself.

The two drugs used by the Indianapolis doctors seem to avoid this difficulty, as they may be given in large doses without bad effect. They stopped the convulsions promptly and generally put the patient to sleep but without interfering with his breathing. The drugs were usually injected into a vein, but are also effective when given by mouth, it was found.

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PHYSIOLOGY

Teaspoonful of Alcohol Detected in Drivers

CONSUMPTION of about one teaspoonful of alcohol can now be detected in an adult as a result of improvement in technic in tests for alcohol in the blood, Dr. Klaus Hansen, professor of pharmacology at the University of Oslo, in Norway, recently stated in discussing application of the new technic to tests for drunkenness in drivers.

The University of Oslo Pharmacological Institute provides free of charge, to physicians making requests, boxes containing tiny glass tubes, fitted with rubber caps, to hold the blood of motor drivers whose sobriety has been questioned by the police.

Although this arrangement has existed only about 18 months, as many as 52 doctors in different parts of Norway have taken advantage of it, and have sent in 373 blood samples for test.

When the concentration of alcohol in the blood was from 2.61 to 5 per thousand, the clinical report of the examining doctor invariably indicated drunkenness on the part of the driver. In such cases the analysis would seem to be superfluous.

On the other hand, it was invaluable when it showed that the concentration of alcohol was so low that the driver could not possibly be under its influence, however excited and unreasonable his behavior. Dr. Hansen refers to a driver whose concentration was as low as 0.03 per thousand, a concentration found even when a person has not drunk any alcohol. Yet, this man was so nervous that he was assumed to be under the influence of alcohol. The analysis saved him from a compromising situation.

Science News Letter, March 11, 1933

PHYSICS-ASTRONOMY

Optician's Window Novelty Measures Heat From Stars

THE RADIOMETER — the little whirligig device inside a glass bulb that is often seen spinning around in an optician's window—has now been used to study the spectrum photographs of stars, which show their composition. This application has been made by Dr. Sinclair Smith and Olin C. Wilson, Jr., of the Mt. Wilson Observatory, Pasadena, Calif.

The common form of radiometer, which was the invention of the great English physicist, Sir William Crookes, consists of four small vanes balanced on a pivot in a partially evacuated bulb. One side of each vane is polished, the other blackened, and the black side of one faces the polished side of the next. When heat radiation, either from the sun or an artificial source, falls on the vanes, they start moving, in the direction of the polished sides. The reason for this is that the black side absorbs more of the radiation than the other, and is heated more. The molecules of the small amount of gas remaining in the bulb are constantly in motion. When they hit the warmer side, they bounce off with a greater kick than those hitting the polished side, and so they push the vanes around.

In the arrangement developed by the Mt. Wilson scientists, two tiny vanes are used, suspended from a fiber of quartz. Thus they cannot turn completely around, as they twist the fiber. To the upper part of the fiber is attached a small mirror. A beam of light falls on this mirror and is reflected to a moving photographic film. As a greater or less amount of radiation falls on the vanes, the fiber twists more or less, and the reflected spot of light moves back and forth, leaving a trace on the film.

The spectrum photographs to be studied are negatives, and show a series of parallel clear lines, of which the relative brightness and widths are significant, as well as their positions. To study them, a strong light is focused to a narrow line on the plate, which is then steadily moved by an electric motor. The light that passes through, and the heat that accompanies it, varies with the intensity of that part of the spectrum plate. This heat falls on the radiometer, and thus the moving spot of light reflected from the mirror traces on the film a record of the intensities of the spectral lines.

Such a device is called a registering spectrophotometer, and previous ones have used either thermocouples or photoelectric cells to detect the light changes. The former converts the heat into electric energy, while the latter makes a similar conversion of light. Dr. Smith states that the new device avoids the electrical difficulties accompanying each of these, and that it is more sensitive than the thermocouple. He also says that it is much simpler, and that many institutions might build one, though unable to afford the other and more expensive instruments.

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PSYCHOLOGY

Mathematical Formula Describes Legislator's Vote

THE COMPLEX factors leading to the vote of a legislator, including such items as party affiliation, lobbying, campaign pledges, bargaining, and so on, can all be taken account of in a single mathematical formula which will indicate his vote on a particular measure, Dr. L. L. Thurstone, psychologist of The University of Chicago, indicated in the *Journal of Social Psychology*.

In his equation, the first part represents the individual member's attitude toward a proposal. In the second part, the loading of one factor, say party affiliation, in this proposal is multiplied by the strength of the member's affiliation with that factor and added to a similar product for other factors.

Other more complicated equations were proposed by Dr. Thurstone to express mathematically the total of all the attitudes of a single member and the total of all the attitudes of the whole legislative body. Working from these equations, it is possible to list and name the various factors which "load" a particular measure, as well as to discover any individual member's identification with these factors, he showed.

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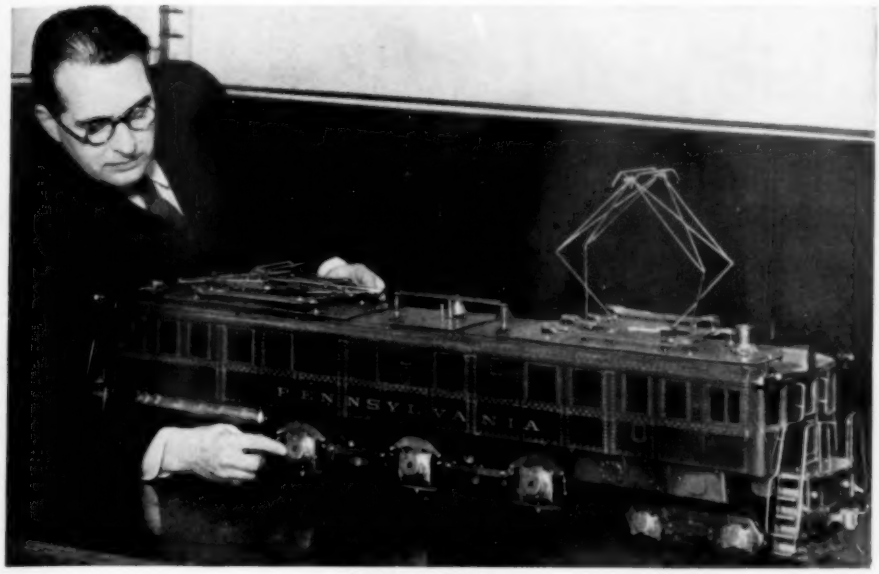

NOT A TOY

ARCHAEOLOGY

Mexico Yields Structure Surpassing Pyramid of Sun

Research Also Reveals New Group of Tombs, Hitherto Unknown Pottery and Child's Grave at Monte Alban

EXISTENCE of a great Mexican pyramid, which outshines in size the famous Pyramid of the Sun near Mexico City, is reported by Alfonso Caso, Mexican archaeologist who is now exploring a little-known region in the Oaxaca mountains.

Mexico's new prehistoric pyramid is at an ancient city known as Tejupan, in the southern part of Mexico associated with the old culture of the Mixtec Indians. The city has been known to exist, but has never before been reached by an archaeologist. Don Esteban Avendano, ranch owner who takes a great interest in archaeological remains in the countryside, explored the great pyramid. He found that it was built in five layers, in the old Mexican fashion of enlarging public structures.

Sr. Caso also announced that he has visited the Hill of the Virgin, an archaeological site brought to his attention recently by Miss Emma Reh, Science Service correspondent. The site is pronounced important because it is a place of Mixtec Indian tombs, about which archaeologists know almost nothing. The tombs, Sr. Caso said, are round and lined with stone, and they ascend like steps, at the same time encircling the cone-shaped Virgin Hill.

Sr. Caso will seek another ancient ruin which Indians described to Miss Reh, and which contains unique pottery decorated with hieroglyphics.

On her recent exploration journey, Miss Reh reached an Indian settlement called Telixtlahuaca, and there heard about the mounds of an "old town" six miles farther on. She pushed on toward the old town, but did not reach it. At an Indian hut, however, she found two pottery bowls dug out of a mound.

The two bowls will be placed in the Mexican National Museum. There are none of like shape in the vast pottery collections in Mexican museums. Each bowl has a small concentric bowl inside it, made as a part of it. The bowls have bases in the form of a two-headed snake.

The bowls are decorated with picture writing, pronounced by Sr. Caso to be of Mixtec Indian type. One bowl has pictures of four individuals, with symbols before their mouths, indicating speech. Other symbols before them represent day-names in the Mixtec calendar. The bowls are thus like pages of picture-writing. (*Turn to Page* 157)

ENGINEERING

Electric Locomotives Modeled for Exhibition

THE WORLD'S most powerful single-unit passenger locomotives have been modeled for the Century of Progress Exhibition which opens in Chicago on June 1.

When plans for the electrification of the Pennsylvania railroad between New York and Washington are completed, 90 of the full-size monsters will be put to work. They are designed to haul trains of 14 steel Pullman cars faster than the economical steam speed.

The model, which was machined with utmost precision to duplicate carefully the original, is only one foot high, eight inches wide, four feet two inches long and weighs seventy pounds. It is exactly one fifteenth the size of the big locomotives and was made in the shops of the Westinghouse Co., one of the concerns engaged in their manufacture.

Because of the density of traffic between New York and Washington, particularly from New York to Philadelphia, this project is attracting widespread attention. It is expected that eventually 136 passenger locomotives, 86 freight locomotives, 98 switching locomotives and 1,637 multiple unit cars will be operated.

The freight locomotives for this electrification are the first steam or electric freight engines to be equipped with roller bearings.

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CHEMISTRY

Element 87 Explosion Injures Finnish Chemist

BLINDED completely in one eye, with his other eye weakened, and with his hearing affected, Prof. Gustave Aartovaara of the Helsingfors Technical University, Finland, is a martyr to his search for a missing chemical element. In 1931, while engaged in the chemical concentration of the missing chemical element 87, Prof. Aartovaara was the victim of a laboratory explosion, the effects of which have prevented his continuance of research.

To Prof. Fred Allison of the Alabama Polytechnic Institute, Prof. Aartovaara sent specimens that he believed contained element 87 and Prof. Allison detected this element by his magneto-optical method of analysis.

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PALEONTOLOGY

Great Lion of La Brea

Animals Larger Than Any on the African Veldt Fought Sabre-Tooth and Sank Into the Same Black Sepulcher

By DR. FRANK THONE

BIGGER by a fourth than the proudest lion that walks the veldt today were the tallest of the great lions of California a hundred thousand years ago. Rivalled in size only by the short-faced bears whose bones have been found with theirs in the La Brea tar-pits, they could confidently assert their first rights even over the terrible sabre-tooth cats that snarled against them in large numbers. What thunders of roaring shook the skies when giant lion and sabre-tooth faced each other over some luckless bison or camel mired in the asphalt, we can only imagine.

But that these rival killers did live in California at the same time, in the days when the northeastern part of this continent was weighted down under a mile's thickness of ice, is now quite solidly established. After years of study of their bones, taken in hundreds of thousands from the tar-pits of La Brea in Los Angeles, Dr. John C. Merriam, president of the Carnegie Institution of Washington, and Dr. Chester Stock, paleontologist of the Los Angeles Museum, have presented the results of their research in the newest Carnegie Institution monograph, which makes available to scientists and the public at large both a sweeping general view of the world these tremendous cats knew and an intimate and detailed knowledge of every bone in their bodies.

As a result of over a quarter-century of work on the vast spoil of perfectly preserved bones dug up out of the oozing pits of tarry asphalt, it is possible to make a certain number of reasonable inferences about the animal life of southern California a thousand centuries ago, and to get some idea of how this tremendous scientific quarry came to be.

Even before Dr. Merriam, as a young man, began to mine the bones out of them, the La Brea tar-pits were known, both as deposits of extinct animal remains and as death-traps for birds and animals of the present time. Observers had seen how wild-fowl, alighting in the shallow water that lay above the

See Front Cover

treacherous sticky asphalt oozing up from the depths of the earth, were mired like flies stuck on fly-paper. They had also seen chickens, squirrels and other incautious animals venture out on the thin concealing layer of dust on its drier parts, and in their turn perish miserably. Finally, they had seen hungry cats and dogs, and even prowling coyotes, lured by what looked like easy prey unable to escape, fall into the same unrelenting death-grip of the oozy tar.

The Pleistocene Veldt

What men saw in present-day California has been going on in these tar-pits for ages. But in California of Ice Age or pleistocene times the catch of the deadly pits was bigger. The land then was a rolling, grassy, well-watered plain, dotted here and there with trees, like the South African veldt of today, and like the veldt it supported uncountable herds of game—humpless camels, wild horses, elephants, antelopes and deer, giant bison, huge ungainly ground sloths: as remarkable a natural menagerie as ever trampled the earth.

Some of these came to the tar-pits, either attracted by the water shining innocently upon their treacherous surfaces, or perhaps just blindly blundering in. Beasts of prey and carrion birds, attracted by this vast array of living or newly-dead bait, swarmed in after them—and met the same doom. Their flesh and skin rotted and disappeared, their skeletons fell apart and were trodden into the soft tar by the struggling feet of new victims, and thus the pits gradually became veritable black charnel puddings, with bones for raisins. It has been the job of half a lifetime for scientists to dish up a part of that pudding, pick out the raisins and identify them, and then piece together their story.

And so we come to the great California lions, that were the rivals of the sabre-tooth cats for the flesh-pots of the California veldt.

There were not nearly so many of them around the tar-pits as there were of the sabre-tooth cats, Drs. Merriam and Stock have found in their analysis of the millions of tar-pit bones. For every lion there were approximately thirty sabre-tooth cats. This does not necessarily mean that there were more sabre-tooth cats then there were lions, nor that the sabre-tooth killers had the better of the argument when they met. It is quite possible that the lions were more numerous out in the open, away from the deep earth fissures where the tar-pits bubbled, and that only occasional specimens went down into the pits to be trapped by the tar.

Indeed, there are points of support for such a theory, both in fossil finds elsewhere and in the anatomy of the lions themselves. Elsewhere in California, as well as in other parts of the country, remains of these lions are more numerous than are the fossils of the sabre-tooth cats. Bones of the latter are most frequently found in caves and fissures, indicating that they lived for choice in rough, broken country, while the lions chose the open plain, though probably ranging into forest and hill lands as well.

The general build of the two giant cats fits fairly well into this picture. The California lion has the same lines as the African lion of today: a massive body, but on long legs. The modern lion is a stalker. He creeps toward his prey, taking advantage of all cover that offers. Then, when he has got as close

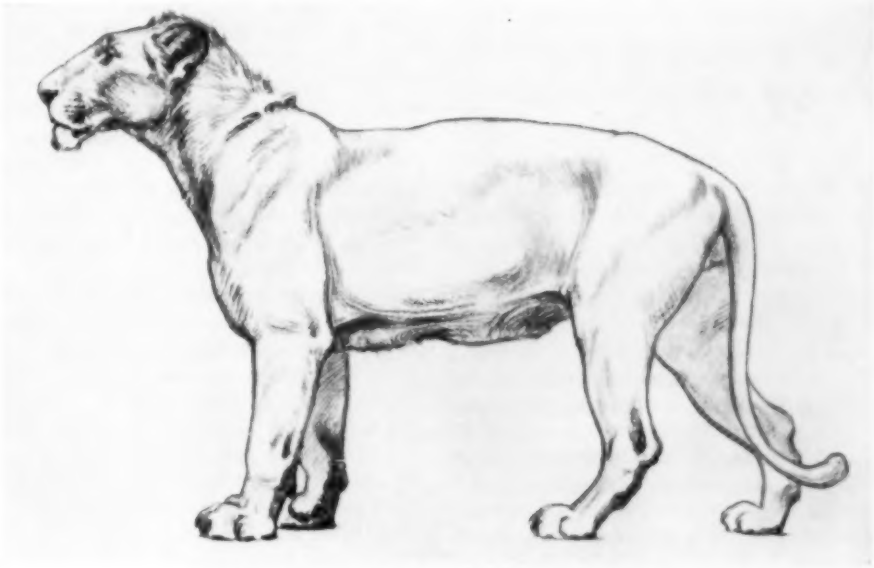
EYETEETH

Skull of the great sabre-tooth cat, showing how the lower jaw could be swung downward, leaving the enormous knife-like eyeteeth free to slash and stab. One of the great daggers has been broken off.

as he can by such cautious approach, he dashes out in a final sprint of fifty or a hundred yards, to leap upon the quarry and pull it down, hanging on terribly with forepaws and teeth. Sometimes the first rush brings down the victim with a broken neck, the vertebrae crushed between the powerful jaws. It seems reasonable to suppose that the California lion's hunting technique may have resembled that of his modern relative.

An alternative suggestion, that the California lion, may have been a tree-climbing hunter like the most formidable of present-day New-World cats, the jaguar, is considered by Dr. Merriam but dismissed as less likely. The California lion's very size would militate against a tree-dwelling life; moreover, his long-leggedness is a further argument in favor of a ground-dwelling habit. Whether or not he had a mane, like the modern male African lion, or whether he had a spotted skin, there is of course no present way of knowing. Nothing but bones have ever been found in the asphalt pits, and unless a lucky find of a piece of skin is made we shall be forever ignorant of the details of the external appearance of this great beast, as well as of the sabre-tooth cat. To be on the safe side, the scientific artist Charles R. Knight, who made restoration drawings of them under Dr. Merriam's direction, left their skins without markings.

The build of the sabre-tooth cat was as much adapted to "still" hunting as that of the lion to stalking. Although as large as a modern lion or tiger in his body, the sabre-tooth was decidedly shorter-legged—and, as though by some correlation, he was rather stumpy-tailed also. This short-leggedness would indicate, possibly, that he lurked in hiding along a game trail or near a water hole, and sought to bring down his quarry at a single pounce, being unable to run fast enough to overtake it in even a short chase. This lurking method of hunting would account for the remains of the sabre-tooth being usually found in caves and broken country, rather than in plains regions like those of the lion. It would also account for the great abundance of sabre-tooth bones in the tar-pits, which constituted a water-hole (albeit a treacherous and deadly one) in a rough area. Furthermore, the sabre-tooth's presumptive preference for unmoving prey might account for his willingness to attack the mired-down victims of the tar, while his relatively low intelligence would fail to warn him of the possibility of his becoming a fresh victim himself.



ROAMED AMERICA 100,000 YEARS AGO

Felis atrox, great lion of California; the largest specimens of these tremendous felines were bigger by a fourth than the largest living lions.

The terrific knife-like tusks of the sabre-tooth cat, which made it impossible for him to bite anything in a normal fashion, have been the source of interminable speculation by scientists of all degree. It seems fairly certain, however, that he killed by stabbing and ripping, rather than by biting and hanging on. His lower jaw could be swung downward through a wide arc, leaving the points of his terrible upper eyeteeth clear to serve as daggers. Their serrated edges, tugged downward and back by the mighty muscles of the neck, must have made terrific wounds, that bled the victim to death in a few minutes.

Killers' Bones Predominate

Since the teeth were used thus for stabbing and slashing, the jaws could not be used for gripping, as in the true cats' mode of killing. To compensate for this lesser hold upon the prey, the forelimbs and shoulders were mightily reinforced; the sabre-tooth was so powerfully "chesty" that the bones of the hindlimbs seem slender by comparison, though they are quite as strong as those of a modern lion.

The lure of "easy meat" mired in the tar-pits must have been exceedingly strong in those cruel old days. A comparative census of the mammals whose bones were dug out of them shows only about a sixth of hunted and nearly five-sixths of hunters. Over half of all the animals represented belonged to the dog family. Most of them were the well-named "dire wolves," *Canis dirus*, giant wolves bigger even than the biggest western "lobo" of today. Nearly a third of all the mammals—more than two-thirds of those remaining after the dogs are counted out, were cats. The cats were dominated by the sabre-tooth as the dogs were by the dire wolf; but prominent among them also was the great California lion, and there were also some smaller cats, including one or two forms closely allied to the modern puma, and a lynx or bobcat.

The scientific names of our two great cats were most happily chosen. Sabre-tooth boasts the title *Smilodon californicus*. That first Greek name has nothing to do with smiling. The first two syllables mean "carving-knife," and the "don" means "tooth." The California lion is called *Felis atrox*—and atrocious indeed he must have seemed to the terrified grass-eating animals on which he came roaring down; atrocious even to the sabre-tooth if it came to even fight between them. For while the average *Felis atrox* was no bigger than a large sabre-tooth, the biggest of the lions far outsized any sabre-tooth that ever walked, and indeed he had only one equal, the great cave lion that lived at about the same time in Europe.

Restoration drawings by Charles R. Knight, under direction of Dr. John C. Merriam.

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ASTRONOMY

Destructive Outburst Of Sun Believed Overdue

A FLARING UP of the sun is overdue. That is a conclusion of an astronomical research by Dr. Conrad Lönnqvist of the Royal Observatory, University of Lund, Sweden, which is commented upon by a note in *Nature*.

From a study of novae, or "new" stars that became very bright suddenly, Dr. Lönnqvist estimated that on the average each star undergoes a nova outburst once in 400,000,000 years. Since the geological record of the earth shows that the sun has not experienced such an outburst in the last 1,000,000,000 years, the inference is that such an outburst of the sun may take place.

Any such outburst of the sun would, of course, destroy the earth.

There is a saving circumstance in the figures. The estimate of the time between outbursts of novae may be three times as great as it should be or only one-third of the correct figure.

Dr. Lönnqvist based his work on an earlier observation that the novae at maximum brightness have a constant magnitude of light.

The novae in the great Andromeda nebula were studied and the distance of the nebula was determined as 930,000 light-years, which checks with distance measures obtained at Mt. Wilson Observatory by use of the Cepheid variable stars. A similar method was used by Dr. Lönnqvist to deduce the distance of each nova from its apparent magnitude when brightest, and consequently to find the frequency of novae in a given volume of space, which can be compared with the estimated number of stars in that volume.

Science News Letter, March 11, 1933

MEDICINE

Conquest of Typhus Nearly Completed

THE LAST STEPS in the conquest of typhus fever are being taken in Washington, D. C., research laboratories and in Mexico. With the cause of the disease and the method of transmission known, scientists are working to perfect vaccines and serums that will give protection against it.

At the National Institute of Health in Washington, a vaccine has been made from typhus fever infected rat fleas, which protects guinea pigs from the disease and promises to develop into a protective vaccine for humans as well.

In Mexico, a vaccine which should give lasting protection against the disease, and a serum which gives protection for a short time and which may be helpful in treating the disease, are being given to human subjects. These two, the vaccine and the serum, were developed by Dr. Hans Zinsser and associates at Harvard University.

Wholesale delousing procedures and war on rats have kept this ancient plague of filth and poverty in check in the past. But these measures are Herculean in difficulty. So disease-fighters are now pinning their hopes of controlling the disease on the development of a serum or vaccine that would be as useful as vaccination for smallpox or the protective serum for typhoid fever.

Science News Letter, March 11, 1933

PSYCHOLOGY

Traffic Problems In Museums Solved

WHEN VISITORS enter museum doors, 75 per cent. turn to the right and start touring the exhibits. Only 25 per cent. bear to the left.

This bit of human psychology, which is of considerable importance to museum curators, has been pointed out by Prof. Edward S. Robinson of Yale University. Prof. Robinson checked up on the wanderings of museum visitors in an effort to aid museums in making their exhibits effective.

Museum curators were not generally aware that the public has its own indoor traffic rules, Prof. Robinson found. More often than not, exhibit cases were arranged to tell a continued story from left to right. This was because the curators laid out their exhibit plans on blue prints, and the eye moved most naturally from left to right.

In his psychological studies of museum labels, Prof. Robinson was able to show that interest in a picture could be increased 50 per cent. by skill in label-writing. The best labels were not what one would have guessed beforehand, he commented. Esthetic labels were unexpectedly appealing.

Prof. Robinson described his museum studies in a report to the American Public Health Association. The same objective measures of determining what is effective in museum halls can be applied to health education, he suggested. Experiments, he said, can provide objective standards of educational efficiency to replace guesswork and hunches.

Science News Letter, March 11, 1933

IN SCIEN

PALEOBOTANY

New Fossil Species Of Sweet Gum Discovered

FOSSIL prints of sweet gum leaves, with three points instead of the familiar five of the modern sweet gum tree species of the southeastern United States, have been found in Wyoming by Dr. Roland W. Brown of the U. S. Geological Survey. The rocks in which they were found were laid down as silts hardening into shales, during the Cretaceous period, last of the ages when dinosaurs walked the earth, perhaps a hundred million years ago.

Because the fossils were found in the banks of Fontanelle Creek, Dr. Brown has named his new species *Liquidambar fontanella*. His technical dsecription will be published in *The Botanical Gazette*.

Science News Letter, March 11, 1933

PHYSICS

Ultra-Rapid Vibrations Decompose Carbohydrates

SUGAR and starch are broken down into simpler compounds by ultrasonic waves, which are vibrations similar to sound waves but much too rapid to be audible, states Prof. A. Szent-Györgyi, director of the Institute of Medical Chemistry of Szeged University, Hungary, in a letter to *Nature*.

Ultra-sonic vibrations, first described by the American physicists, Prof. R. W. Wood and A. L. Loomis, are obtained by the action of high-frequency radio waves upon a thin quartz plate, which transforms them from electro-magnetic waves into mechanical vibrations.

With vibrations having a frequency of 723,000 per second, Prof. Szent-Györgyi and A. Szalay found that cane sugar can be broken down to simpler molecules (monosaccharides) and the particles composing starch, gelatin and gum acacia can be broken down to smaller dimensions.

It is hoped that ultra-sonics will furnish a new method of measurement of the strength of chemical bonds which hold atoms and molecules together.

Science News Letter, March 11, 1933

EN FIELDS

PHYSICS

Water Used Successfully Against Oil Fires

FIRE CHIEF Stein, of Magdeburg, Germany, dared to doubt the firm belief of all orthodox firemen that water must not be used to fight oil fires. Moreover, he backed up his own opinion with action, and proceeded to prove that water can be used, most effectively, to extinguish oil fires if properly applied.

The Stein method does not call for the addition of any chemical agents to the water, nor does it require elaborate equipment. The fire is not flooded with great masses of liquid water, which would merely spread the flames; instead the water is atomized through an adjustable nozzle which throws a cone-shaped jet of fine spray over the fire. In this form, which is much like a jet of steam but much cooler, a double fire extinguishing effect is exerted by the water; the air supply, essential to continued burning of the oil, is cut off, and the burning oil is greatly cooled because large amounts of heat are absorbed as the fine water droplets are suddenly evaporated into steam over the hot oil.

In a test fire, to prove the performance of the new method, a pool of about 250 gallons of crude oil was set on fire, and the flames were completely extinguished in a few seconds.

Science News Letter, March 11, 1933

MEDICINE

Secret of Cancer May Be Found in Glands of Body

THE SECRET of cancer may be hidden in the glands of the body.

The most significant progress in the search for the cause of cancer is being made in laboratories where these glands are being studied, Dr. James Ewing, himself an eminent cancer authority and director of cancer research at Memorial Hospital in New York, told members of the American Society for the Control of Cancer.

No single agent or growth-promoting substance has been shown by these studies to be the cause of cancer. On the contrary, the studies indicate that there is no single cause of cancer, Dr. Ewing said. Study of how these organs work in health and disease is most likely to reveal the cause of cancer of the organs, he suggested.

Cancers of certain glands secrete the powerful hormones of these glands, he reported. A specific test for one group of cancers, those of the sex glands, has been devised as a result of discovering a hormone substance in all these cancers. Reviewing all cancer research, Dr. Ewing concluded:

"There may be ever so many interesting chemical and physical processes going on in cancer tissues, but the whole subject takes on real meaning only when we learn that the entire play of forces is controlled by a hormone acting in very minute amounts."

Science News Letter, March 11, 1933

METEOROLOGY-AERONAUTICS

Prediction of Damaging Wind Gusts Sought

UNEXPECTED wind gusts, one of the greatest dangers facing airship operations today, are being studied by the Guggenheim Airship Institute in Akron, Ohio.

In the future when airships are walked from their hangar here the Institute officials hope to be able to forecast wind gusts. Thus if it were known that a gust was scheduled to arrive at the time of ground operations the crew would have the choice of two alternatives to avoid serious injury to the ship; either delay the operations till the passing of the gust or place more men on the side of the ship where the gust would strike.

The Guggenheim Airship Institute Building forms a triangle with the Goodyear-Zeppelin Airdock and the Akron Airport Administration Building, each side of this triangle being about a mile. At each of these stations, two instruments will be erected, one to determine velocity and the other direction of wind gusts.

Both wind velocity and direction instruments record by means of photoelectric cells. The cup anemometer rotates a slotted disk which varies a light falling upon the photoelectric cell which is connected to a recorder. The turning of a weather vane similarly varies light playing upon another photocell and allows an automatic record. Records will be automatically plotted.

Science News Letter, March 11, 1933

INVENTION

Metal Blackboards Made For Use in Schools

SHEET METAL blackboards, with a vitreous porcelain enamel surface, may replace slate in schoolrooms, with the invention in Grand Rapids, Mich., of a metal blackboard declared to be one of the most practical innovations since slate boards were adopted for classroom use in 1863.

Substitutes for slate board have been sought for years. Etched glass, fiber board, composition board and painted wood have been among substitutes suggested. The steel blackboard was conceived by R. S. Conrow, Middletown, Ohio, and perfected for commercial production in the laboratories of a school equipment concern.

Vitreous enamel is applied to ingot iron sheets in manufacture and an acid bath used to remove the sheen of the enamel. The paint is applied under vibration to insure a smooth surface. A method of joining panels together with a flat joint through interlocking fingers on the back, and a way of firing a curvature into the board so that it will cling to a wall surface have been worked out.

In laboratory tests, 24,000 chalk marks and erasures were made on one spot in the metal blackboard, without hurting the surface. The same test wore a hole in slate an eighth of an inch deep. The metal blackboard is said to weigh only half as much as one made of slate, to have a permanent color, not to be affected with cleansing fluids, and to be rustproof.

Science News Letter, March 11, 1933

PHYSICS-MEDICINE

800,000 Volt X-Ray Tube To Treat Cancer

CANCER will soon be treated at Mercy Hospital, Chicago, with a giant X-ray tube, with a voltage of 800,000 and a radiation output equivalent to radium worth $75,000,000.

The new tube comes from the General Electric laboratories in Schenectady. It has several times the energy rating of the cancer treating tube installed about two years ago in Memorial Hospital, New York.

The tube itself is 14 feet long and it is being installed in such a manner as to assure the comfort and safety of patients and the hospital staff.

Science News Letter, March 11, 1933

PHYSIOLOGY

Smoking Found to Increase Carbon Monoxide in Blood

TOBACCO smoking increases the amount of carbon monoxide in the blood of persons living under normal conditions and not exposed to obviously large amounts of the deadly gas, Dr. Alexander O. Gettler and Marjorie R. Mattice of Bellevue and Allied Hospitals and New York Post-Graduate Medical School of Columbia University, have found.

In their report to the American Medical Association they point out that the ideal normal person should have no carbon monoxide in his blood. But the average person under ordinary conditions is exposed so frequently to the colorless killer from automobile exhausts and other places that it is not possible to regard him as being entirely carbon monoxide free, although ordinary tests for toxic amounts of the gas might not show any in his blood.

Dr. Gettler and Miss Mattice consequently used a very delicate test for extremely small amounts of carbon monoxide in blood. The blood is tested because this gas combines with blood hemoglobin, preventing the latter from playing its role of oxygen carrier, with generally fatal results. They tested the blood of persons living in New York City but exposed to minimal amounts of the gas; persons living in the country; and persons who might be exposed to the gas in the course of their work, such as street cleaners and taxi drivers.

As might be expected, the average for the carbon monoxide percentage in the blood was highest for taxi drivers, next highest for street cleaners and lowest for persons living under ideal rural conditions. But even these persons had some of the gas in their blood.

The surprising fact was that tobacco smoking was apparently the most conspicuous factor in determining how much of the blood hemoglobin combined with the gas. The amount to which the individual was exposed seemed secondary.

One of the street cleaners, for example, worked on a street with an elevated railway over it, and fairly dense traffic composed largely of trucks, which produce more carbon monoxide than pleasure cars. He came to the laboratory after work, in his working clothes, having walked only one block from work. But of all the group he had the smallest amount of carbon monoxide in his blood. He does not smoke. In contrast, one of the cleaners who stopped in the morning on his way to work had more than the average for the group. But he had smoked six cigarettes on his way.

Science News Letter, March 11, 1933

An expedition in southwest Africa has found a shrike that whistles so much like a boy that it is hard to realize the whistler is a bird.

RADIO

The Science Service radio address next week will be on the subject

THE ANCIENT IRISH PEOPLE

by

Dr. James A. Geary

—of the Department of Comparative Philology and Celtic Languages, Catholic University of America, Washington, D. C.

FRIDAY, MARCH 17

at 12:45 P. M. Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

GEOLOGY

Old Shipwreck Gives Clue To Formation of Petroleum

AN ILL WIND that wrecked a fishing boat off Admiralty Island, Alaska, twenty or thirty years ago, may have blown some good to scientists who have been trying to find out how petroleum got into the crust of the earth.

When the boat went down it was loaded with herring. In time it went to pieces, and so did the fish. But recently some samples of the bottom near where the wreck occurred were sent to Washington, D. C., to the U. S. Geological Survey, for analysis of a curious waxy substance they contained.

This proved to be a complex compound of several acids formed by the decomposition of the fat in the fish, combined with calcium and magnesium in the sea water. By heating this stuff for a week at a fairly high temperature, chemists of the Survey obtained a more or less petroleum-like oil.

Dr. R. C. Wells, who reported on the investigation, stressed the fact that the Survey is not trying to find a way to make artificial petroleum, especially with the price of crude oil where it is. What he and his associates want to find out is how the natural petroleum was formed in the earth, and the fate of the lost cargo of herring may supply a clue.

It has long been assumed by geologists that petroleum was formed ages ago from the fats or oils in the bodies of organisms—probably animals and plants much smaller than fish. But petroleum is quite different from organic oils and fats, so that the search for the intermediate stages or connecting links has gone on for many years.

The fact that the fatty acids formed by the decomposition of the herring united into a complex waxy salt with minerals in the sea water suggests that something of the sort may have happened in the earth's ancient seas. The solid stuff, buried in the ooze and silt of the sea bottom, could accumulate there and remain unchanged for ages. Then, when the deeply buried sediments were slowly squeezed and solidified into rock, the pressure and its accompanying heat could have literally fried the oil out of the calcium-magnesium salts again, if not directly into crude oil, then at least into another and closer intermediate stage.

Science News Letter, March 11, 1933

CHEMISTRY-PHYSICS

Last of the Phlogistonists

"A Classic of Science"

Priestley, Preferring the Older Theory, Realized That Ideas Important to Him Might But Amuse His Followers

EXPERIMENTS AND OBSERVATIONS ON DIFFERENT KINDS OF AIR, and other branches of Natural Philosophy connected with the subject. In Three Volumes; being the former Six Volumes abridged and methodized, with many Additions. By Joseph Priestley. Birmingham, Printed by Thomas Pearson; MDCCXC. (1790). *This is an exact reprint of extracts from the original publication.*

IT IS ALWAYS our endeavour, after making experiments, to *generalize* the conclusions we draw from them, and by this means to form a *theory*, or *system of principles*, to which all the *facts* may be reduced, and by means of which we may be able to foretel the result of future experiments. With a view to this it has of late been a great object with philosophers to ascertain the number of *elements* that are necessary to constitute all the substances with which we are acquainted, and especially the different kinds of air, to which our attention has been much directed, in consequence of their seeming to bring us a little nearer to the ultimate constituent parts of bodies; finding that by their union they are capable of forming solid masses.

In my former publications I have frequently promised, and sometimes attempted, to give such a general theory of the experiments in which the different kinds of air are concerned as the present state of our knowledge of them enabled me to do, and I cannot well decline attempting something of the same kind in this new edition of all I have published before; though I acknowledge that I am very far from being able to satisfy myself with respect to it, and therefore cannot expect to give much satisfaction to others. When I published the first of my six volumes, I was not aware of much difficulty on this subject, but new experiments soon unhinged whatever I had thought best established; and this has been so often the case, that my diffidence increases in full proportion to the increase of our knowledge.

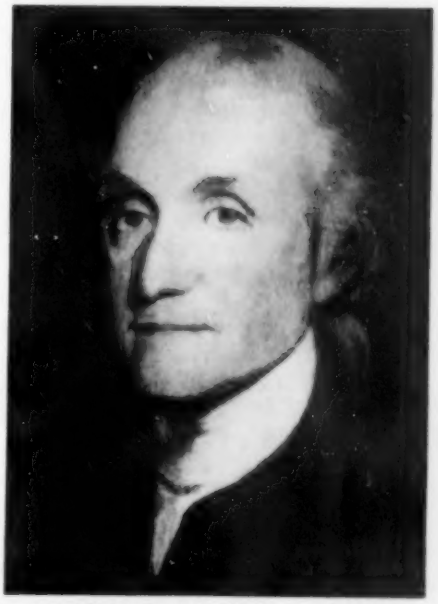
Fluctuating, however, as the present state of this branch of knowledge is, I shall not decline to give my present views of it; nor shall I find any more difficulty in retracting any opinion I shall now advance, than I have hitherto done in retracting what I have advanced before. The sketch that I shall now give may at least serve, like former theories, to amuse us when we look back upon it, after having gained a more perfect knowledge of the subject.

According to my latest observations, *water*, or rather *vapour*, is the basis of all kinds of air, or that to which they owe their peculiar kind of *elasticity;* so that all kinds of air may be said to be vapour with something else so attached to it, as to prevent its condensation in the temperature of the atmosphere.

The most simple of all the kinds of air are the *inflammable* and *dephlogisticated;* the former consisting of water and phlogiston, and the latter of water and something that may be called the *principle of acidity*, as it appears to be necessary to the constitution of all acids. Water seems to constitute about nine parts in ten of dephlogisticated air, but there seems to be a much less proportion of it in inflammable air. . . .

The Doctrine of Phlogiston

According to Stahl, phlogiston is a real substance, capable of being transferred from one body to another, its presence or absence making a remarkable difference in the properties of bodies, whether it add to their weight, or not. Thus he concluded that oil of vitriol deprived of water, and united to phlogiston, becomes sulphur, and that the calces of metals, by the addition of the same substance, become metals. The air that has since been discovered in the calces of metals, make no great difference in the system. For as oil of vitriol must part with its water, as well as imbibe phlogiston, in order to its becoming sulphur, so the calx must part with its air, as well as imbibe phlogiston, in order to become a metal.



JOSEPH PRIESTLEY, 1733-1804

What is now contended for is, that in the oil of vitriol changing into sulphur, something is *lost*, and nothing *gained;* and also that a calx becomes a metal by the loss of air only. And did facts correspond on this theory, it would certainly be preferable to that of Stahl, as being more *simple;* there being one principle less to take into our account in explaining the changes of bodies. But I do not know of any case in which phlogiston has been supposed to enter into a body, but where there is room to suppose that *something* does enter into it.

What has been insisted upon, as most favourable to the exclusion of phlogiston, is the revival of mercury, without the addition of any other substance, from the *precipitate per se*. In this case it is evident that mere *heat*, either in a close retort, or in vacuo, is sufficient to revive the metal. And as what is expelled from this calx is the purest dephlogisticated air, it has been said that mercury is changed into this calx by imbibing pure air, and therefore becomes a metal again mere- (*Turn Page*)

ly in consequence of parting with that air.

But Mr. Kirwan explains this case in the following manner, which to me appears satisfactory. The metal, when exposed to a certain degree of heat, in contact with pure air, imbibes indeed the pure air, and nothing else, retaining the whole of its own phlogiston; so that then it may be said to contain fixed air, which is composed of phlogiston and dephlogisticated air; and that in a greater degree of heat, the latter is expelled while the former is retained; so that this calx was always possessed of phlogiston sufficient for its own revival.

But that mercury may be deprived of its phlogiston, so as to be incapable of becoming running mercury again by mere heat, is evident from my experiments on *turbith mineral*. For if this substance be exposed to heat in a very clean earthen vessel, the vitriolic acid so effectually carries away its phlogiston, that a great proportion of it is left a mere calx, capable of bearing any degree of heat without revival; and it can never become running mercury again, but by being heated in contact with inflammable air, or some other substance containing phlogiston. It is evident, therefore, that this calx, which is a dark red substance, sometimes hard, and sometimes powdery, is mercury deprived of its phlogiston, and something must enter into it before it can become a metal. Consequently, the metals are not simple substances, but phlogiston always enters into their composition. This, indeed, is evident from those of my experiments in which I produce any of the metals from the calces, by heating them in inflammable air, which is imbibed by them.

Mons. Lavoisier, and many who follow him, are of opinion that what has been called phlogiston, is nothing more than one of the constituent parts of water, the other being the *principle of acidity;* and this doctrine of the composition and decomposition of water, has been made the basis of an entirely new system of chemistry, and a new set of terms has been invented, and appropriated to it.

It must be acknowledged, that substances possessed of very different properties, may, as I have said, be composed of the same elements in different proportions, and different modes of combination. It cannot therefore be said to be absolutely *impossible* but that water may be composed of these two elements, or of any other; but then the supposition should not be admitted without *proof;* and if a former theory will sufficiently account for all the *facts,* there is no occasion to have recourse to a new one attended with no peculiar advantage.

Joseph Priestley was born 200 years ago, March 31, 1733. He was a Nonconformist in religion and an independent investigator in science. In chemical theory he followed Stahl and the "doctrine" of phlogiston instead of his contemporary Lavoisier and the theories of oxidation which have survived. Yet this statement of his beliefs shows him as still holding the scientific attitude of mind as well as the misleading theory would let him. Priestley's discovery of fixed air (carbon dioxide) was published as the Classic of Science in the SCIENCE NEWS LETTER of Dec. 24, 1927 and his discovery of nitrogen as the residual gas when air is "diminished" by combustion as the Classic of Science in the SCIENCE NEWS LETTER of Aug. 13, 1932. His discovery of oxygen will appear in its place in the series of Classics on the history of the chemical elements.

Science News Letter, March 11, 1933

SEISMOLOGY

New Quake in Same Deep As Great Shock of 1923

JAPAN'S newest misfortune, the earthquake that brought death and destruction and tidal wave on Thursday, March 2, was born of the same geologic conditions that caused the even greater disaster of Sept. 1, 1923, when thousands of lives were snuffed out in the crowded cities of Tokyo and Nagaaki and the general region around Sagami Bay. The epicenter of the recent earthquake was located fully five hundred miles to the north, but it lies in the same submarine valley, known to oceanographers as Tuscarora Deep, which has its southern end in Sagami Bay. Furthermore, the tidal wave that swept down on the coast of Japan was probably caused by the same kind of earth movement, a sudden drop of a part of the bottom of this valley which started the disturbance in the water and sent it sweeping toward the helpless towns on the shore.

As soon as the earthquake occurred, seismographs in all parts of the world registered its distance and indicated that it was very severe. These data, collected by wire and radio by Science Service, were decoded by scientists of the U. S. Coast and Geodetic Survey. They gave the exact moment of the beginning of the quake as 12:31.2 p. m., eastern standard time, and the location of the epicenter as 39.5 degrees north latitude, 143.5 degrees east longitude. This is a point about 100 miles east of the north end of Honshu, principal island in the Japanese group.

Science News Letter, March 11, 1933

CHEMISTRY

Cheap Chemical Prevents Rancidity in Oils and Fats

MALEIC ACID, a cheaply and easily produced synthetic compound, has been found to be a good thing to add to edible fats and oils to keep them from getting rancid. Dr. G. R. Greenbank of the U. S. Department of Agriculture, who made the discovery, has applied for a public service patent on its use for this and similar purposes. Under such a patent, the product can be used freely by anybody, and no one can establish a monopoly.

Dr. Greenbank was led to his discovery by a project in chemical research, with the object of finding why some oils and fats kept naturally better than others. He did not succeed in learning this, but did learn that the natural "better keepers" contained minute quantities of unidentified organic acids.

Then he tried adding acids of known composition to oils and fats, and soon found that maleic acid, added in a proportion of one part to ten thousand of the oil to be preserved, would enable it to stand without turning rancid for about three times as long as untreated samples of the same oils.

Dr. Greenbank has tried this method on many fats and oils used as food and in the industries, including butterfat, butter, lard, and the oils of cottonseed, peanuts, corn and sesame. He has also tried it on such food products as milk powder and pie-crust, and he believes it will be useful in the cereal industries.

The chemistry of maleic acid's efficiency in preventing rancidity is not yet known. Dr. Greenbank thinks it possible, however, that it operates by stopping the formation of peroxides, which are intermediate steps in the respirational-digestive processes of the bacteria and other fermentive organisms that oxidizes fats and oils, thereby splitting off the acids that give the rancid odors.

Maleic acid is now made by manufacturers of photographic reagents and sells for a few cents an ounce.

Science News Letter, March 11, 1933

ASTRONOMY

Dr. Shapley Suggests Galaxies Are Irregularly Distributed

THE DISTANT galaxies, those clouds of stars far beyond our own galactic system, which includes the sun and all the stars that we ordinarily observe in the sky, seem to be irregularly distributed in space. This is the opinion expressed by Dr. Harlow Shapley, director of the Harvard College Observatory, in the *Observatory Bulletin*. Furthermore, he suggests, these irregularities are the result of some evolutionary process in the higher system of which the galaxies themselves are the units.

These galaxies appear on the photographs taken through great telescopes as faint nebulae, and they show in greatest numbers in regions far from the Milky Way, for there the stars in our own galaxy, and the associated dark matter, obscure them. But even in the regions where they are most numerous, there is considerable irregularity in their distribution. The question was whether or not this is real, or whether they too are partly hidden by dark material in space. The nebulae studied by Dr. Shapley are those nearer than 25 megaparsecs. A megaparsec is the biggest unit of distance employed by astronomers. It is the distance that light will travel in 3,260,000 years.

Dr. Shapley's research was to determine whether there was any correlation between the distribution of these galaxies, and that of the faint stars. These stars are presumably the most distant in our own Milky Way system, and so, if the sparseness of the galaxies was the result of dark matter in our own system, the stars should be affected similarly. However, he finds that there is no correlation whatever. The stars are also distributed very irregularly, but in some regions where they are thick, the galaxies are very scarce, and vice versa. There are other cases where the two happen to be most numerous in the same regions.

"From these simple tests," states Dr. Shapley, "it appears that the distribution of external galaxies is wholly independent of the distribution of faint stars, and we deduce therefrom that if obscuring matter is involved it is external to our own galactic system. A much more reasonable assumption, of course, is that the irregularities in apparent distribution are real and indicate groupings of external galaxies. The irregularities are obviously too pronounced to be attributed to chance; they are rather a demonstration of evolutionary tendencies in the metagalactic system."

Fits Previous Researches

This idea would fit in with earlier researches by Dr. Shapley which indicated that distant space is reasonably transparent, in that it is not filled with a sort of mist. This was shown by a study of the relation of the size of the galaxies to their surface brightness. If space is transparent, the distant ones would be faint merely because they seem smaller than those which are nearer. If space were filled with some sort of obscuring fog, however, the brightness of a certain area of the distant galaxies would be less than that of a corresponding area in a nearer one. However he found that the average surface brightness was fairly constant regardless of distance. If there were actual dark clouds that obscured all the light if they obscured any, the surface brightness would not be affected. But in the absence of any evidence that there are such clouds beyond our galaxy, it is more reasonable to assume, as Dr. Shapley suggests, that the irregularities are real.

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From Page 149

Sr. Caso and his associates made their most important tomb discovery of the season at Monte Alban very shortly before they closed the work there. Seven feet under ground, they encountered this tomb. Inside, they found the skeleton of a girl nine or ten years old, with her toys and other possessions. There was a red tiger with a ruffled collar, a real-looking figure of a baby, a red owl whistle which still hoots when you try its note, and an animal-shaped vessel with human head, and other things. All these were of clay.

To the archaeologists, this is not merely a bright picture of child life in old Mexico. This "Tomb Thirty-Three" is the most ancient found in the graveyard and the first of its type. The contents shed light on a very early period of Mexican pre-history. The Indian child's simple possessions draw from the archaeologists the comment that this is the most important pottery yet found at Monte Alban.

The pottery, they pronounce, is a primitive Zapotec Indian type. They place it, historically, in transition between the archaic culture of Middle America, sometime over a thousand years ago, and the culture developed by Zapotec Indians. Over the grave ceiling the archaeologists discovered two archaic clay female figures and a large pot ornamented with the head of a man with a duck's bill.

The grave apparently corresponds in age to the mysterious Dancers' Temple at Monte Alban. On the temple are half-human carvings in grotesque poses which have puzzled archaeologists. The animal-shaped vessel with human head in the child's tomb reveals a posture like the weird temple carvings.

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MEDICINE

High Voltage Tubes Declared Of Little Value Against Cancer

THE OLD ADAGE, "Shoemaker, stick to your last!" was told, in effect, to the world's physicists in an editorial in the *American Journal of Cancer*. Dr. Francis Carter Wood of Columbia University is editor of the *Journal*.

Very high voltages in X-rays are probably of little or no use in treating cancer, stated the editorial.

"The physicists who have suggested that a million volt X-ray will do wonders in the curing of cancer had better return to their own problem of fracturing the atom," the editorial declared.

"The real question in the treatment of cancer today is the adjustment of the dosage administered to the biological rhythms in the cancer cell and the surrounding healthy tissues.

"Of all the variables entering into the problem, the wavelength of the radiation as determined by the voltage is probably the least important."

Radium and moderate voltage X-ray have been found equally effective for treating cancer, when used under the same conditions. Radium is not considered any better than X-ray except when it is possible to obtain intense local action by inserting radium into the tissues.

"It is therefore very doubtful that unusual curative possibilities lie in a million volt X-ray, for six million volt X-ray is available in radium," the editorial concluded.

The expense and difficulty of handling the apparatus furnishing greater voltages than the present commercial limit of 300 kilovolts must not be forgotten. It is preferable to place the money which the high-voltage apparatus would require in radium because of the greater convenience and ease with which that substance can be handled, the editorial suggested.

"Cost is of immense importance, for the vital fact is that radiation should be available for the many rather than limited to the few victims of cancer who have large means."

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weight among waters. The light water is about 13 parts per million lighter than normal water.

Prof. Gilbert N. Lewis, University of California chemist, has obtained heavy water which now holds the world's record, by use of the Bureau of Standards method.

This extraordinary water has a specific gravity of 1.035, whereas normal water is the liquid upon which specific gravity measurements are based and therefore its specific gravity has a value of one. More than one-third of the hydrogen in the heavy water consists of the hydrogen isotope of atomic weight approximately two.

The heavy water obtained at the University of California is 35,000 parts per million heavier than ordinary water, whereas the U. S. Bureau of Standards water is 1,400 parts per million heavier than normal. Experiments showed that the University of California heavy water has a refractive index one tenth per cent. below that of ordinary water.

The unusual waters are no mere curiosities but steps to a more precise knowledge of the properties of matter. From such slight differences that might seem insignificant at first glance, some of the most important industrial developments in our modern world have arisen.

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ARCHAEOLOGY

35-Century Old Egyptian Quarries Found

EGYPTIAN quarries, lost 35 centuries, have been discovered by a Cairo museum official in the desert west of the Nile, near Abu-Simbel.

The quarries contain diorite, a gray colored rock. Amethystine quartz is present in the rock, indicating that the ancient Egyptians may have used these quarries as a source of their amethyst.

Discovery of the quarries follows an earlier, accidental discovery made by Sir Charles Spinks, inspector general of the Egyptian army. While on western desert patrol he found cairns containing stone tablets and tables of offerings. Museum officials became interested and investigated the region.

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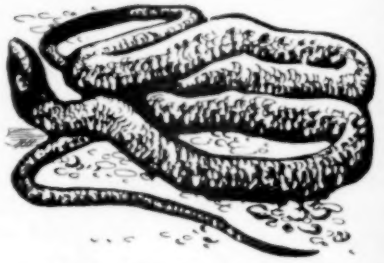
BIOLOGY

NATURE RAMBLINGS by Frank Thone



No Snakes for St. Patrick

OLD LEGENDS to the contrary notwithstanding, St. Patrick never drove any snakes out of Ireland.

Even if the great bishop of Erin had had any time to spare for herpetological pursuits, he would have been hard put to it for raw material, for there hasn't been a snake in Ireland for at least a hundred thousand years.

If there ever were any snakes in Ireland at all, they were driven out by a mightier than Patrick, wielding a greater weapon than a bishop's crozier.

They were driven out by Patrick's master, the Lord God himself. And He used the cold breath of the great glaciers, that lay over the earth in prehuman days, to rid the Green Island of its serpents.

It is not certain that the ice of the Pleistocene ever covered all of Ireland. It would not be necessary for it to do so, however, in order to do away with snakes and other reptiles. Snakes are creatures of the sun. No snake could live within hundreds of miles of the front of the continental glaciers.

But when the ice retreated, leaving Ireland warm again, what was there to prevent the snakes from coming back?

Salt water. Ireland has been separate from England, in a geographic sense at least, ever since the Ice Age closed. And no snake can cross the Irish Sea, or any other body of salt water. There is only one genus of snakes in the world that habitually lives in salt water, and they are tropical serpents that never lived anywhere near Ireland. Land snakes can swim in fresh water all right, but they dread salt water almost as much as they do fire. So Ireland has sat, securely seagirt against all serpents, through all human times.

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•First Glances at New Books

Additional Reviews On Page 160

General Science

THE SMALL-COMMUNITY MUSEUM—W. N. Berkeley—*J. P. Bell, Lynchburg, Va.*, 88 p., $1.75. The author argues convincingly in favor of a community having its own museum, however small. Having shown the advantages, Dr. Berkeley, himself a small community museum director, explains the ways and means of starting a museum and running it, and making it useful. The book makes many specific suggestions, and should be very helpful to those interested in museums.

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Geography

MODERN BUSINESS GEOGRAPHY—Ellsworth Huntington and Sumner W. Cushing—*World Book Co.*, 352 p., $1.96. This revised edition brings up to date a well known text on the economic angles of geography. Intended for the junior high school grades, the book gives the pupils new ways of looking at the countries that have become familiar in many geography lessons. The main subjects are: primary production, transportation, manufacturing, and consumption. The pages abound in pictures, charts, problems, and other devices calculated to impress the points of the text.

Science News Letter, March 11, 1933

Biology

THE ACTION OF THE LIVING CELL—Fenton B. Turck—*Macmillan*, 308 p., $3.50. For many years, the late Dr. Turck maintained a thesis postulating a special substance, *cytost*, which had profoundly modifying effects on cell life, and he performed many experiments tending to support it. In this book, which was in press when he died, he sums up his whole doctrine.

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Sociology

ORGANIZING FAMILY SOCIAL WORK IN SMALLER CITIES—Francis H. McLean—*Family Welfare Association of America*, 32 p., 25c.

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Hygiene

FOUNDATIONS OF HEALTH—Josephine L. Rathbone, Francis L. Bacon, Charles H. Keene—*Houghton Mifflin*, 413, p., $1.56. A splendid textbook of hygiene for highschool use. Particularly noteworthy is the sane, temperate, scientific attitude of the authors, evident throughout the book. It is to be hoped that students of the book can learn this attitude, which is one of the most valuable lessons of the text.

Science News Letter, March 11, 1933

Psychology

THE INFLUENCE OF STUTTERING ON THE PERSONALITY—Wendell Johnson—*University of Iowa*, 140 p., Cloth, $1.35, Paper, $1. One of the "Studies in Child Welfare." The results of a study of eighty stutterers. Emphasis was placed upon the investigation of attitudes and adaptations with regard to school, home, vocational and social situations. Attitudes toward stuttering, toward self and toward other people were examined. Fantasies and wishes were studied. Specific personality problems were identified and investigated.

Science News Letter, March 11, 1933

Botany

THE NATURAL GARDENS OF NORTH CAROLINA—B. W. Wells—*Univ. of North Carolina Press*, 458 p., $3.50. Seldom has the vegetation of a state received a treatment at once so adequate botanically and so interesting to the non-professional outdoorsman. North Carolina, to be sure, affords most unusual opportunities for the botanically inclined person, with its wonderfully varied habitats all the way from the Great Smoky Mountains to the seacoast swamps and dunes, and in its considerable list of "private" plants headed by the famous Venus-flytrap. In this book the various habitats are first treated ecologically, and then the principal plants are listed and briefly described floristically.

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Medical Economics

THE INCOMES OF PHYSICIANS—Maurice Leven—*University of Chicago*, 135 p., $2. Publication of the Committee on the Costs of Medical Care.

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Psychology

BOOK REVIEWS AND OTHER MATTERS, Bulletin XVII—W. F. Prince, Von Hofsten and Hornell Hart—*Boston Society for Psychic Research*, 77 p., 75c. This bulletin supplements previous bulletins of the Society. It includes an hypothesis on psychical phenomena by Prof. Hornell Hart of Bryn Mawr College.

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Hygiene

THE NEW HEALTHY LIVING SERIES C.—E. A. Winslow and M. L. Hahn—*Merrill*, four volumes of 200-250 pages each, first three volumes 64c each, fourth 68c. The titles are: The Game of Healthy Living; The Habits of Healthy Living; The Laws of Healthy Living; The Healthy Community. These are self-explanatory. The texts are simple, sound, well-illustrated and interesting. They are designed for use in elementary and junior high school grades, and should be effective hygiene text books.

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Archaeology

CORINTH, Vol. I—Harold North Fowler and Richard Stillwell—*Harvard Univ. Press*, 239 p., 154 illus., 21 pl. (in portfolio), $7.50. For many years, the American School of Classical Studies at Athens has been working at Corinth. This volume of the reports fills in the background of Corinthian history and geography, and surveys archaeological remains. Following are chapters on certain individual buildings or streets. The volume stresses architectural features. With its many illustrations, and its wealth of fact, the report provides a most useful reference work on Corinth.

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Economics

ESSENTIALS OF A PROGRAM OF UNEMPLOYMENT RESERVES—*National Industrial Conference Board*, 68 p., $1.

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Genetics

RECENT ADVANCES IN AGRICULTURAL PLANT BREEDING—H. Hunter and H. M. Leake—*Blakiston's*, 361 p., 16 pl., $4. The junior author of this book was at one time located in Trinidad, so that the plants discussed range from those of temperate regions to those of the tropics.

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Agronomy

FERTILIZERS AND CROP PRODUCTION—L. L. Van Slyke—*Orange Judd*, 493 p., $4. A complete handbook in its field, at once thoroughly scientific and thoroughly practical.

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Psychology-Sociology

MENTAL HYGIENE ASPECTS OF THE FAMILY—J. S. Plant—*Family Welfare Association of America*, 25 p., 25c.

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First Glances at New Books

Additional Reviews On Page 159

Zoology

NATURE BY NIGHT—Arthur R. Thompson—*Ivor Nicholson and Watson, London,* $3. The world is full of animals of all degree, from mammals to insects, that go about their several businesses at night, so that we seldom get much of an idea of what they are like. Herein the present author places us in his debt, for he not only gives us good descriptions and tells of habits but adds something over a hundred excellent photographs.

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Sociology-Psychology

HUMAN ASPECTS OF UNEMPLOYMENT AND RELIEF—James M. Williams—*University of North Carolina Press,* 235 p., $2.50. The book originated in an investigation of the effect of unemployment and welfare practices in five cities of New York State, where, the author believes, conditions are probably a little better than elsewhere in the country. Vivid pictures of individual families are portrayed. The author's emphasis is on the effect on the children.

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Geology

REPORT OF THE COMMITTEE ON SEDIMENTATION, 1930-1932—*National Research Council,* 229 p., $1. This publication (N. R. C. Bul. 89) contains 22 chapters by various authors, reporting original research, summarizing known facts in various parts of the field of sedimentation, and abstracting literature. The work was done by a committee under the chairmanship of Dr. W. H. Twenhofel.

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Evolution

A PICTURE BOOK OF EVOLUTION—C. M. Beadnell—*Watts,* 309 p., $2.50. Dennis Hird's old Picture Book of Evolution is here revised by a Surgeon Rear-Admiral of the British Navy. Basically the book is Darwinism, frequently of a very naive type; the illustrations, though copious, are quite miscellaneous, and many of them are less than mediocre in quality.

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Phonetics

ZEITSCHRIFT FUER EXPERIMENTAL-PHONETIK—Edited by Prof. Dr. E. W. Scripture—*J. A. Barth, Leipzig,* 15 RM per volume. This journal, the organ of the International Association for Experimental Phonetics, is still in its first volume. The *Hefte* in hand contain articles on the speech of epileptics, sound films in the service of experimental phonetics, an analysis of two poems recited by Galsworthy, etc.

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Archaeology

CHILD LIFE IN GREEK ART—Anita Klein—*Columbia Univ. Press,* xv+55 p., 40 pl., $3.50. From Greek vases and monuments and other graphic and plastic records Dr. Klein has assembled a wealth of intimate information about how children lived in ancient Greece. The pictures show their dress and toys, their lessons and amusements, how they were nursed when they were sick and even how they were spanked when they were naughty, and the text documents them most admirably.

Science News Letter, March 11, 1933

Horticulture

GARDENING IN THE SOUTHWEST—Edited by Mrs. Gross R. Scruggs—*Southwest Press, Dallas,* 230 p., $2.50. This book, sponsored by the Texas Federation of Garden Clubs, is adapted for conditions in Texas and the states immediately to the east and west. It goes into the matter of making a garden with real thoroughness, not only suggesting what flowers, shrubs and trees to use but giving valuable information on the handling of problems of soil, water and light.

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Archaeology

ARCHAEOLOGY OF KAUAI—Wendell Clark Bennett—*Bernice P. Bishop Museum,* 156 p., 15 pl. Tells of nine months' field work, and summarizes from literature and collections what else is known of the archaeology of this small, but culturally important, island in Hawaii.

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Psychology

PSYCHOLOGY—Shepherd Ivory Franz and Kate Gordon—*McGraw-Hill,* 494 p., $2.50. A comprehensive and clearly written book for the elementary student and general reader. Many new illustrations add to the interest.

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Physiology

SEX AND INTERNAL SECRETIONS—Edited by Edgar Allen—*Williams and Wilkins,* xviii+951 p., $10. Enormous though the importance of recent research in the physiology of sex is to physiologist and physician alike, the mass of scattered publication has been so huge and so rapid in its production that even specialists could keep up with it only in an exceedingly narrow *"Fach,"* and the scientist of more general interests simply has had to give it up. Now a number of the most active workers in the field have come to the rescue of biologists (including themselves) by summarizing and collating their work into one volume, which though somewhat bulky is still digestible and above all consolingly complete and carrying the assurance of authenticity. This book is one of the relatively few which can be designated as absolutely necessary for both experimenter and clinician. The book represents the work of a committee of the National Research Council over a period of more than ten years.

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Psychology

REMEMBERING: A STUDY IN EXPERIMENTAL AND SOCIAL PSYCHOLOGY—F. C. Bartlett—*Macmillan,* 317 p., $5. A most interesting collection of original experiments on remembering and allied matters such as imaging and perceiving. One method of the author was like that of the old parlor game of "gossip." The first subject would read a story twice, then reproduce it and pass his reproduction on to the second subject who would repeat the process. The changes *en route* were analyzed.

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Psychology-Child Development

PHYSICAL AND MENTAL ADOLESCENT GROWTH—*Brush Foundation and Western Reserve University,* 152 p., $1. The proceedings of the Conference on Adolescence, containing papers by Todd, Davenport, Hellman, McCollum and others. A limited number of copies are available and can be obtained from Dr. Wingate Todd, 2109 Adelbert Road, Cleveland, Ohio.

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